The Sky is Falling

Using cloud-seeding technology to produce rain

Because drought and water shortages are ever-present threats, many Texas Water Districts have constructed alternate methods of preserving, and now producing water. Cloud-seeding is one such solution.

Cloud-seeding introduces foreign particles into an unproductive cloud, enhancing the formation of water droplets. In simpler terms, it is a way to produce rain by increasing the size of water droplets in a cloud that otherwise aren't heavy enough to fall on their own.

Silver iodide is a favored seeding agent because its crystalline composition is almost equal to the structure of ice crystals contained in convective clouds. Seeding with silver iodide can supply up to ten trillion artificial ice crystals.

Seeding takes place either below or above a cloud. In the first method, an aircraft's wings are mounted with flares burning silver iodide, which is then released beneath the cloud. The cloud's updraft carries the particles into the core of the cloud where tiny water droplets, which can create rain, are abundant. Wing-tipped generators containing acetone and seeding material can also outfit the aircraft.

From above the cloud, an aircraft drops the silver iodide flares into the upper region of seedable convective clouds. The crystals develop rapidly by tapping the vast field of moisture as the cloud grows, attracting water droplets in the cloud. The ice crystals quickly transform into a raindrop heavy enough to fall to the ground.

Texas has a rather extensive weather modification program.

- The first statewide program, the Colorado River Municipal Water District, is one of the oldest weather modification programs in the world. Established in 1971 to generate runoff into Lake Thomas and E.V. Spence Reservoir on the Colorado River, this program covers 2.6 million acres between Lubbock and Midland.
- The West Texas Weather Modification Association, based in San Angelo, covers 6.4 million acres in west central Texas.

- The South Texas Weather Modification Association is based just south of San Antonio and runs on a year-round basis, covering 6.6 million acres.

- The Southern Ogallala Aquifer Rain Program embraces territory in Texas and New Mexico. It covers 5.8 million acres.

- The West Central Texas Weather Modification Association, established in 2001, covers 4.9 million acres and bases its radar and aircraft in Abilene.

- The Trans Pecos Weather Modification Association is the newest rain enhancement program. Begun in May 2003, it covers 5.1 million acres between El Paso and Midland and operates its own equipment.

Cloud-seeding is a long-term commitment that requires much planning and constant work. It must be done consistently to provide definite results. Weather modification programs must survive for years in order to be useful because of the great variations in weather.

Additionally, cloud-seeding can be counterproductive if performed too late in the cloud formation-dissipation cycle. Since not all clouds have the potential to create rain, there are certain guidelines. Convective clouds are best for cloud-seeding because they are unstable in the atmosphere, making them better alteration candidates. The cloud must also have a temperature below 23 degrees Fahrenheit and have sufficient moisture, or seeding will not be effective. Seeding at the wrong time or place can actually decrease rainfall.

Another concern regarding cloud-seeding is the downwind effect–the theory that increased rainfall produced by weather modification in one area is offset by decreased rainfall in another area. However, the Texas Department of Licensing and Regulation (TDLR), claims that cloud-seeding can actually increase rainfall up to 100 miles downwind from the intended area.

The TDLR works to promote the growth and use of cloud-seeding technology through research, contributing $0.045 per acre of the total cost (about $0.08 per acre) of cloud-seeding. The TDLR was also responsible for administrating the Texas Weather Modification Act of 1967. This act requires agencies to regulate cloud-seeding through a licensing process in order to control it in the state of Texas, forcing responsible use of this weather modification technique.

The most obvious advantage of cloud-seeding is increased rainfall compared with unseeded clouds of the same height.

“Cloud-seeding can increase rain levels by 200 percent, cloud area by 43 percent and precipitation time by 39 percent,” said George Bomar, state meteorologist. “Weather modification can also reduce the size of hail, another beneficial result.”

Seeded clouds also have more longevity and ground area coverage. The resulting rains are more gentle, widespread, and longer-lasting.